

Science Enabling ASICs and FEEs for the JUICE and JEO Missions.

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A family of science enabling radiation hard Application Specific Integrated Circuits (ASICs), Front End Electronics (FEEs) and Event Processing Systems, with flight heritage on many NASA missions, is presented. These technologies play an important role in the miniaturization of instruments -and spacecraft systems- at the same time increasing performance and reducing power. The technologies target time of flight, position sensing, and energy measurements as well as standard housekeeping and telemetry functions for particle and fields instruments, but find applications in other instrument categories too. More specifically the technologies include: the TOF chip, 1D and 2D Delay Lines with MCP detectors, for high precision fast and low power time of flight and position sensing; the Energy chip for multichannel SSD readout with time over threshold and standard voltage read out for TDC and ADC digitization; Fast multi – channel read out chip with commandable thresholds; the TRIO chip for multiplexed ADC and housekeeping etc. It should be mentioned that the ASICs include basic trigger capabilities to enable random event processing in a heavy background of penetrators and UV foreground. Typical instruments include time of flight versus energy and look angle particle analyzers such as: plasma composition, energetic particle, neutral atom imaging as well as fast plasma and deltaE/E ion/electron telescopes. Flight missions include: Cassini/LEMMS, IMAGE/HENA, MESSENGER/EPPS/MLA/X-ray/MLA, STEREO, PLUTO-NH/PEPSSI/LORI, IBEX-Lo, JUNO/JEDI, RBSP/RBSPICE, MMS/HPCA/EPD, SO/SIS. Given the proven capability on heavy radiation missions such as JUNO, MMS and RBSB, as well diverse long duration missions such as MESSENGER, PLUTO and Cassini, it is expected that these technologies will play an important role in the particle and fields (at least) instruments on the upcoming JUICE and JEO missions.